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SOME PLANTS FROM THE VICINITY OF LONGS PEAK INN, COLORADO

BY T. D. A. COCKERELL

During the latter part of June, my wife and I visited Longs Peak Inn, where the versatile Enos Mills tries to convert a more or less philistine public to some appreciation of the ways of nature, and in his leisure moments writes charming books describing the fauna and other features of the region. Mr. Mills describes his place as a wild flower garden, and has posted up a notice requesting visitors not to wantonly and wastefully pick flowers. Those who will not heed, claiming that it is their inalienable right to destroy as much as they please, are politely informed when the next car leaves the Inn. The flora of Estes Park and Longs Peak have been studied by two generations of visiting botanists, and one might suppose that there would be little new to record. In a sense, however, we are still at the beginning of our botanical studies in that region. Our manuals are necessarily so condensed that they omit almost everything beyond the barest taxonomic facts, and this brevity reacts upon botanists using them, who are usually ready to dismiss a plant, when duly identified, as "well known." Not only does our taxonomic treatment need much revision in the light of careful field work, but there are innumerable problems to be solved, connected with variation, methods of pollination, and what not. Thus any visitor may find out some interesting things even in a couple of days, or may regard from new points of view facts long ago recorded in the books. The following notes merely illustrate this point, and are based upon observations made during three days (June 24-26) at altitudes from about 7,500 to 11,400 feet.

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The citations of "Nelson" and "Rydberg," without reference to volume or page, refer always to the well-known works by these authors treating of the plants of Colorado.*

A special effort was made to find orchids, but only the three following species were obtained.

1. *Limnorchis viridiflora* (Chamisso) Rydb. In a swampy place at Estes Park Village.
2. *Lysiella obtusata* (Pursh) Rydb. Longs Peak Inn. Found by my wife, who was so fortunate as to observe a moth visiting the flowers, evidently serving as an agent in pollination. A specimen captured carries a bright yellow pollinium on its head, the base of the stalk attached to the front of the moth's left eye. The moth proves on examination to be a perfectly typical *Rheumaptera tristata* (L.), a species common to the northern parts of America and Europe. Rydberg states that *Lysiella obtusata* occurs in a single European locality, in northern Norway. It is interesting to know that it may there be visited by the same species of moth.
3. *Coeloglossum bracteatum* (Willd.) Parl. Longs Peak Inn. Found by my wife. This appears to be very rare in Colorado; Rydberg merely cites it from Colorado, adding "exact locality not given." Nelson gives the distribution as "Northern Wyoming, eastward and to the Atlantic," thus excluding Colorado altogether. Our plant is perfectly characteristic of the species.
4. *Populus tremuloides minor* Cockerell, 1891. (Nature Notes, p. 14.) Abundant about Longs Peak Inn. This is the earlier name for the western aspen, but if it is regarded as a distinct species, it will according to the botanical rules stand as *P. aurea* Tidestrom, 1911.
5. *Bistorta bistortoides* (Pursh) Small. A common plant of meadows at Longs Peak Inn, alt. 8,956 feet. In Washington State, Piper cites this as a species of the Arid Transition Zone; with us it is especially characteristic of the Canadian.

* Coulter and Nelson, New Manual of Botany of the Central Rocky Mountains, January, 1910; P. A. Rydberg, Flora of Colorado, 1906.

6. *Silene acaulis* L. Abundant above timber line on the trail from Longs Peak Inn to Longs Peak. The petals are a delicate pale pink, varying to whitish. In Schinz and Keller's *Flore de la Suisse*, they are described as "carnées," which may pass; but there is no excuse for the descriptions of our American manuals, "purple or purplish" (Britton and Brown; Nelson); "purple, or rarely white" (Coulter); "purplish, rarely white" (Synoptical Flora). Our plant has the petals strongly emarginate at end. Britton and Brown say there is a scale at the base of the blade; Nelson says "a small scale at the summit of the claw." As a matter of fact there are two flattened fleshy lobes, contrasting with the pink of the blade.

7. *Caltha leptosepala* f. **chionophila** (*Caltha chionophila* Greene). The *Caltha* growing abundantly in damp depressions above timber line is certainly only an alpine form of the species common in the Canadian Zone below. There are two types of high alpine modification, that due to the direct effect of the environment on the individual (as has been actually proved in Europe by transferring plants to lower altitudes), and that which is inherent in the constitution of the plant. Presumably those plants which are permanently modified, so that they retain their peculiarities when grown at lower levels, or refuse altogether to grow below the high alpine zone, have longest occupied alpine situations. No doubt in some cases both types of modification exist in the same plant, and in the case of plants changing by direct response to climatic conditions, those having gametic variations in the same direction would no doubt be favored in the struggle for existence, such variations tending to make the necessary response more certain or more complete. Another case analogous to that of the *Caltha* is seen in the common *Frasera* of the Longs Peak region, which extends to timber line, where it assumes a singular dwarfed appearance, exactly as if the plants had been broken off by some one in the middle, and then stuck in the sand.

8. *Pulsatilla hirsutissima* (Pursh) Britton. We were much interested to find this, in perfectly typical form, growing sparingly above timber line (at about 11,300 ft.) on the Longs Peak trail, some of the plants not yet through flowering.
9. *Cheirinia Cockerelliana* (*Erysimum Cockerellianum* Daniels, Univ. of Mo. Studies, 1911). Very abundant, running to very rich shades of orange and brownish-orange, all about Longs Peak Inn, and up into the Hudsonian Zone. This is surely not the *Erysimum Wheeleri*, described from San Francisco Mountain, Arizona, though specimens in the herbarium will look much alike, *E. Wheeleri* being much too large to preserve entire, at least when fully grown.
10. *Cheirinia nivalis radicata* (*Erysimum radicum* Rydberg). Abundant above timber line on the Longs Peak trail. The leaves are more or less sinuate-dentate, and the plant is certainly *radicum*, but it can hardly be doubted that Nelson is correct in regarding this as conspecific with *C. nivalis* (Greene) Rydb. The oldest name for the aggregate is *Erysimum asperum nanum* Cockerell, Nature Notes, 1891, p. 15; I think, however, that the species is a valid one, and according to the botanical rules Greene's name takes precedence. It is certainly very striking to come out of the forest, where *C. Cockerelliana* is so abundant, and find taking its place a species not only of lower stature, but almost uniformly with clear yellow flowers. I should have said quite uniformly so, had I not found a single plant with reddish petals, the purplish pigment being so arranged as to leave yellow streaks and margins, an arrangement quite different from that of *C. Cockerelliana* in which the anthocyan pigment is diffused. I have never collected *C. amoena* (Greene) Rydb., which is like *nivalis* but is said to have flowers colored like those of *Cockerelliana*. It is, I suppose, a derivative of *nivalis*, originating in some such form as my single sport described above, and not a variety of *Cockerelliana*. In addition to the sport described, some of the plants with pure yellow

- flowers had the apical half of the sepals purplish. In western Europe, the species of *Cheirinia* have yellow flowers, so that this character is one of those used to conveniently separate the genus from *Cheiranthus*, which ranges through the same colors as *Cheirinia Cockerelliana*.
11. *Sedum stenopetalum rubrolineatum* Cockerell, 1891. This strongly reddened form is the phase of the species regularly occupying high altitudes; extremely abundant from Longs Peak Inn to timber line, affording food to the larva of the beautiful butterfly *Parnassius*. I brought a couple of plants to Boulder, to grow in the garden, to see whether the red color is permanent at a lower altitude, though I can hardly doubt that it will prove so. This appears to be identical with *S. subalpinum* Blankinship, 1905, which is said by that author to occur in "alpine and subalpine situations," "passing below into *S. stenopetalum*." I do not think it can possibly be regarded as a distinct species, and in this opinion I have the support of Dr. N. L. Britton (litt., Oct., 1905). It is, however, a good race.
 12. *Dryas octopetala* L. This beautiful plant was found in abundance at and above timber line, looking just as it did when I found it some years ago on the top of the Rigi, in Switzerland.
 13. *Primula angustifolia* Torrey. Common above timber line. This is an excellent example of a permanently modified alpine plant. By the form of the seed capsule and leaves, this falls in a different section of the genus from *P. Parryi* of the Hudsonian Zone in Colorado. It is in fact an isolated species in the Rocky Mountain Flora, nearest to *P. Cusickiana* of Oregon, and more or less related to the Old World *P. nivalis*.
 14. *Androsace carinata* Torrey. Abundant above timber line. Coulter says the corolla is white with a yellowish eye, and this is true of half or more of the plants; but a very common phase has the "eye" bright pink. Our plants were studied in the *exact* type locality of *Douglasia John-*

stoni A. Nelson. The types of Nelson's description were obtained too late in the year to show the color of the corolla. The form with the pink "eye" may be known as mut. **nelsoni**, nov.; the closely related Old World *A. chamaejasme* varies in the same manner. The color variation is apparently somewhat obscured by differences due to age, but there are two types, one with, the other without, the red pigment. The carination of the leaves is really very slight. Nelson has separated this species from *Androsace* as the type of a genus *Drosace*. It is possible that a genus may be maintained for this and related caespitose forms, but if so, the name must apparently be *Aretia* Linné, based on the Old World *Aretia alpina* L. It is true that typical *Aretia* has the peduncles one-flowered, but there is no absolute line of division here, since *Androsace coronata uniflora*, from the Himalayas, has one or sometimes two flowers on a stalk.* This is a species very closely related to our *A. carinata*.

The *Primula* and *Androsace* here discussed represent the arctic-alpine flora derived from that of the Old World, and seeming in a way out of place in our country, like the alpine poppy. It is curious that even so far north as the State of Washington, according to Piper, there is no *Primula* or *Androsace* whatever.

15. *Phlox caespitosa* Nuttall. Abundant above timber line. The flowers are of a peculiar light blue, just like the common greenhouse *Plumbago*.
16. *Polemonium confertum* Gray. This magnificent species is abundant above timber line. In one place a variety with white flowers (mut. **albiflorum** nov.) was quite common. This would seem to run in Nelson's key to *P. mellitum*, which is a distinct species of lower altitudes (e. g., Sunset, Boulder County, fide D. M. Andrews). On comparing blue and white flowers growing close together, I noted that the stigmatic branches were longer in the white

* *Androsace coronata* (*A. chamaejasme* var. *coronata*, Watt. Journ. Linn. Soc., 20); *A. coronata uniflora* (*A. chamaejasme* var. *uniflora*, Hooker f., Fl. Brit. Ind., 3).

flowers, but otherwise the plants were exactly alike. The white flowers do not show any blue at all in life, but on drying the ends of the corolla lobes turn bluish, showing that anthocyan is not entirely absent.

17. *Eritrichium argenteum* Wight ("argenteum White" in Rydberg). Common above timber line, the flowers the brightest possible blue.
18. *Pentstemon glaucus* Graham. Not very common along the trail above Longs Peak Inn, at about 10,000 ft. (Hudsonian Zone). In life this is a very curious and singularly inconspicuous species, the flowers a sort of dark purplish red. Herbarium specimens give no good idea of its true appearance. Our plant is *glaucus*, not *stenosepalus*.
19. *Castilleja occidentalis* Torrey. A small, very inconspicuous species, with orange-tipped bracts (no sign of red), was common above timber line. I suppose it to be *occidentalis*, but we have in the University of Colorado herbarium specimens of a different plant, a reduced form of *C. sulphurea* or very close thereto, determined as *occidentalis* by Nelson.
20. *Castilleja*, hybrid? Near Longs Peak Inn we found a number of plants of *C. sulphurea* Rydb. (here using the name, with Nelson, to include *luteovirens*), and along with them some variable forms which were taken, in the field, to be hybrids with *C. confusa* Greene. A characteristic example of the supposed hybrid has the bracts greenish yellow, broadly tipped with pale red. The foliage does not differ at all from that of *sulphurea*; thus the leaves are too broad for *confusa*. The stem is hairy, which is not true of *sulphurea*. The reddest plants found at this particular spot have the calyx deeply cleft in front and behind, but only briefly so at the sides, thus not according well with *confusa*. It is possible that all the plants colored with red should be referred to *C. rhexifolia* Rydb., which may in fact be of hybrid origin. I should hardly offer these notes on *Castilleja*, except to point out the necessity for further study in the field. Nelson and

Rydberg disagree greatly as to the limitations of the species of *Castilleja*, and it is probable that much remains to be done before the Colorado species are properly understood. It can hardly be doubted that hybrids are more or less frequent.

21. *Rydbergia grandiflora* (T. & G.) Greene. This species, with its large orange heads, was very conspicuous everywhere above timber line. It is one of the very few plants of austral origin which have pushed their way up into the high alpine zone, being in fact a sort of glorified *Hymenoxys* or *Tetranneuris*. It is singular that the one member of this alliance which has reached these seemingly inhospitable heights should have by far the finest and largest flower-heads of all.
22. *Artemisia scopulorum* Gray. Common above timber line; a genuinely alpine species, apparently not found in the zone below.
23. *Senecio rosulatus* Rydberg. Abundant on dry hills at Estes Park Village. At one place we found several plants of a form (mut. **primulinus**, nov.) with pale primrose-yellow rays; a variation analogous to that seen in the cultivated "primrose" sunflower.

Palaeobotany teaches us that many of the better defined genera of plants are of enormous antiquity. The careful work of C. and E. M. Reid has shown that modern species at least commonly date as far back as the Pleistocene, while in a number of instances there appears to have been no appreciable change since the Pliocene. On the other hand, the living flora is constantly mutating, producing variations or sports, which follow well established lines and can almost be predicted. It is as though we had before us a seething mixture, in which different elements came to the surface from time to time. The red sunflower, originating, so far as we know, in a single plant found by the roadside in Boulder, was a striking novelty among sunflowers. In spite of the enormous numbers of the *Helianthus annuus* group growing wild and in cultivation, no one, so far as can be determined, had ever seen such a plant before. Never-

theless, in its original form, and in the various combinations and modifications produced during the last few years in cultivation, the red sunflower merely follows the path already well worn by other genera of Compositae, such as *Helenium* and *Gaillardia*. Just as in the orange and orange-brown forms of *Cheirinia*, it is simply a matter of the increase of anthocyan pigments. Characters of this sort frequently become diagnostic of species; or originating somewhere, being inherited in Mendelian fashion, produce a well-marked dichroic condition in a type previously nearly uniform. In the case of the red sunflower, "red" plants are already beginning to appear in various places about Boulder, the pollen having been carried from our garden by bees. It will be interesting to see whether, in a number of years, the "red" variety becomes established as a regularly occurring variation in the wild flora; and if it does so about Boulder, whether it will gradually spread over the plains. Such questions are certainly interesting and make it abundantly worth while to closely study and describe variations as they are found to occur.

SHORTER NOTES

SCLEROCARPUS AFRICANUS JACQ. IN AMERICA.—The composite genus *Sclerocarpus* is interesting as having its type species in tropical Africa and its others in warm temperate and tropical America. The object of this note is to record the occurrence of *S. africanus* Jacq. on the Island of St. Thomas, Danish West Indies, where a solitary plant was found on a sandy beach near Charlotte Amalia in February, 1913 (*Britton, Britton & Marble 483*): only one plant could be found after an hour's search of the locality, and it therefore seems probable that this is a waif.

N. L. BRITTON

✓ TWO NEW AMERICAN GRASSES.—*Schizachyrium curasavicum* sp. nov.

Annual. Stems 1–2 dm. tall, branched, glabrous; leaf-sheaths smooth and glabrous, keeled; blades up to 8 cm. long, 3–4 mm. wide, flat, linear, gradually narrowed above to an acute point, glabrous on the keeled lower surface, the upper surface sparingly